
Beyond knockout rats: new insights into finer genome manipulation in rats.

Journal: Cell Cycle

Publication Year: 2011

Authors: Guanyi Huang, Chang Tong, Dhruv S Kumbhani, Charles Ashton, Hexin Yan, Qi-Long Ying

PubMed link: 21383544

Funding Grants: CIRM Stem Cell Biology Training Program

Public Summary:

The ability to "knockout" specific genes in mice via embryonic stem (ES) cell-based gene-targeting technology has significantly enriched our understanding of gene function in normal and disease phenotypes. Improvements on this original strategy have been developed to enable the manipulation of genomes in a more sophisticated fashion with unprecedented precision. The rat is the model of choice in many areas of scientific investigation despite the lack of rat genetic toolboxes. Most Recent advances of zinc finger nucleases (ZFNs) and rat ES cells are diminishing the gap between rat and mouse with respect to reverse genetic approaches. Importantly, the establishment of rat ES cell-based gene targeting technology, in combination with the unique advantages of using rats, provides new, exciting opportunities to create animal models that mimic human diseases more faithfully. We hereby report our recent results concerning finer genetic modifications in the rat, and propose their potential applications in addressing biological questions.

Scientific Abstract:

The ability to "knockout" specific genes in mice via embryonic stem (ES) cell-based gene-targeting technology has significantly enriched our understanding of gene function in normal and disease phenotypes. Improvements on this original strategy have been developed to enable the manipulation of genomes in a more sophisticated fashion with unprecedented precision. The rat is the model of choice in many areas of scientific investigation despite the lack of rat genetic toolboxes. Most Recent advances of zinc finger nucleases (ZFNs) and rat ES cells are diminishing the gap between rat and mouse with respect to reverse genetic approaches. Importantly, the establishment of rat ES cell-based gene targeting technology, in combination with the unique advantages of using rats, provides new, exciting opportunities to create animal models that mimic human diseases more faithfully. We hereby report our recent results concerning finer genetic modifications in the rat, and propose their potential applications in addressing biological questions.

Source URL: <https://www.cirm.ca.gov/about-cirm/publications/beyond-knockout-rats-new-insights-finer-genome-manipulation-rats>